

What is Claimed is:

1. A process for arresting a flame in a pipe having a localized restriction therein, said pipe carrying a flammable but deflagratable gas, said process comprising the steps of:

(a) centrally positioning a reflection suppressor in one selected opposite end region of a detonation flame arrestor, said reflection suppressor having—

-side wall portions that extend between a base portion and an apex portion thereof,

a length that is shorter than the distance between said orifice and said matrix of elements in a selected one of said opposite end portions,

-a cross-sectional area along said length between said base portion and said apex portion that generally declines with increasing distance from said base portion,
and

-said base portion having a cross-sectional area that is less than the cross sectional area of said selected one opposite end region; and

(b) connecting each of said orifices across said pipe so that said detonation flame arrestor is located at a situs in said pipe that is between said restriction therein and a region thereof where ignition of said flammable gas could occur; said flame arrestor being oriented so that said reflection suppressor therein has said base thereof facing in the pipe direction of said restriction,

whereby, when ignition occurs, and an advancing flame front with an associated pressure wave occurs in said region and propagates through said pipe, said flame front is suppressed upon reaching and entering said flame arrestor, but said pressure wave passes through said flame arrestor and around said reflection suppressor and travels in said pipe to said restriction, and a

reflection pressure wave is produced at said restriction which propagates back through said pipe to said detonation flame arrestor, strikes said reflection suppressor, and is attenuated thereby.

2. The process of claim 1 wherein said detonation flame arrestor is of the type having--

- a longitudinally elongated housing having orifices defined at opposite ends thereof,

- a mid-region in said housing holding a matrix of elements which define small channels that extend longitudinally therethrough, and

- a pair of opposite end regions in said housing, each said end region being located between a different one of said orifices and said matrix of elements.

3. The process of claim 2 wherein said mid-region has a larger diameter than said pipe.

4. The process of claim 2 wherein said mid-region has a larger diameter than either of said orifices.

5. The process of claim 4 wherein each of said opposite end regions tapers from its associated orifice to said mid-region.

6. The process of claim 1 wherein said flame suppressor is conically shaped.

7. The process of claim 1 wherein said flame suppressor has smooth, continuously extending sides.

8. The process of claim 1 wherein said detonation flame arrestor has a mid-region that has a larger diameter than said pipe.

9. The process of claim 1 wherein a reflection suppressor is centrally positioned in each opposite end region of a detonation flame arrestor, thereby to enable achievement of flame arrestment from either direction along a so connected pipe.

10. A combination of a detonation flame arrestor with a reflection suppressor comprising in combination:

(a) a housing having

- opposite housing ends with an orifice defined at each opposite end,
- a mid-region having opposite mid-region ends, each said mid-region end being defined by a transversely extending, apertured wall member,
- a matrix of elements disposed in said mid-region, which define small channels that extend longitudinally therethrough,
- a pair of opposite end regions in said housing, each said end region being located between a different one of said orifices and said matrix of elements;

(b) a reflection suppressor having—

- side wall portions that extend between a base portion and an apex portion thereof, a length that is shorter than the distance between said orifice and said matrix of elements in a selected one of said opposite end portions,
- a cross-sectional area along said length between said base portion and said apex portion that generally declines with increasing distance from said base portion, and
- said base portion having a cross-sectional area that is less than the cross sectional area of said selected one opposite end region;

(c) mounting means for mounting said reflection suppressor in one of said opposite end regions with said reflection suppressor being centrally positioned in said one opposite end regions with said base portion being located adjacent to said orifice at said one opposite end region;

whereby an advancing flame front with an associated pressure wave can enter the opposed one of said orifices, the flame of said flame front can be suppressed in said mid-region, said pressure wave can pass through said mid-region and around said reflection suppressor and out said orifice, and

whereby a reflection wave that propagates back to said orifice strikes said reflection suppressor and is attenuated thereby.

11. The combination of claim 10 wherein said housing is longitudinally elongated.

12. A combination of detonation flame arrestor with reflection suppressor comprising in combination:

- (a) a cross-sectionally circular, axially elongated housing having
 - (1) opposite housing ends each with an aperture defined thereat,
 - (2) a diametrically enlarged mid-region of a generally uniform diameter and opposed mid-region ends,
 - (3) a pair of apertured wall members, each one transversely extending across said housing at a different one of said mid-region ends,
 - (4) a matrix of elements disposed in said mid-region which define small, gas conducting channels that extend generally longitudinally through said mid-region and said plate members,

- (5) a tapered region extending between each said opposite end and the adjacent one of said apertured wall members;
 - (b) a tapered body centrally located in one of said tapered regions, said tapered body having a longitudinal length that is less than the axial length of said tapered region;
 - (1) said tapered body having an apex end and a base end that is longitudinally spaced from said apex end,
 - (2) said base end having a substantially larger cross-sectional area than said apex end,
 - (3) said longitudinal length additionally being such that said base end is located approximately adjacent to said outlet aperture at said one tapered region while said apex end is located approximately adjacent to the adjacent one of said mid-region ends in said one tapered region, and
 - (c) support means for said housing and said tapered body.
13. The combination of claim 12 wherein said mid-region is charged with a porous, substantially non-compressible, substantially non-combustible flame arrestor fill material.
14. The combination of claim 12 wherein flame arrestor fill material is comprised of an inorganic material.
15. The combination of claim 12 wherein a second tapered body is centrally located in the other of said tapered regions, said second tapered body having a longitudinal length that is less than the axial length of said other tapered region;
- (1) said second tapered body having an apex end and a base end that is longitudinally spaced from said apex end,

- (2) said base end having a substantially larger cross-sectional area than said apex end,
- (3) said longitudinal length additionally being such that said base end is located approximately adjacent to said outlet aperture at said other tapered region while said apex end is located approximately adjacent to the adjacent one of said mid-region ends in said other tapered region.